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ORIGINAL ARTICLES.

SOME REMARKS ON ARGYROL (SILVER VITELLINE).

By ADOLF ALT, M.D.,
ST. LOUIS.

ALTHOUGH, as I have stated at different occasions, protargol has given great satisfaction in my hands in the treatment of conjunctival affections, notably in blenorrhœa neonatorum, I have in the last few weeks given extensive trials to a new substitute for nitrate of silver. I refer to argyrol (silver vitelline). The peculiarities and efficiency as a therapeutic agent of this new silver preparation are such that, in my opinion, it should be speedily added to the therapeutic agents used in ophthalmic practice, and I do not hesitate to recommend it to my confrères, who perhaps have as yet not become acquainted with it.

The following concerning this new silver preparation is published in the *Medical Record* (May 24, 1902) by Drs. A. C. Barnes and H. Hille of Philadelphia, its originators:

"The chemical and physical properties of this compound are unique. First of all, it contains 30 per cent. of silver—twice the amount of any proteid silver heretofore produced. The extreme solubility of our silver compound is remarkable. One ounce of it is freely and completely soluble in less than

a dessertspoonful of water—a fact which will be wondered at by physicians who have been able, only with great difficulty, to obtain even a 5-per-cent solution of other proteid silver compounds.

"Solutions of silver vitelline, no matter how concentrated, do not precipitate albumen or sodium chloride; hence it can have no coagulating or caustic effects upon mucous membranes, nor can it be chemically changed by their secretions. The disadvantages of silver nitrate are due to its coagulating effect on mucous membranes, whereby its action is limited to the surface, and its penetrative power to the deeper structures prevented; it is, moreover, irritating and caustic. Briefly stated, the pharmacologic laws governing the therapeutic value of any silver compound are these: It must not coagulate albumen nor precipitate chlorides; must not be irritating, and must possess the power to penetrate into the submucous structures. It is also a pharmacologic axiom that, with the above conditions fulfilled, a silver salt depends for its therapeutic activity upon the amount of silver contained; *i. e.*, the greater the amount of silver, the greater its therapeutic value.

"We have made a number of experiments to determine the penetrative action of silver vitelline upon the human tissues covered with mucous membrane, but the simplest one was suggested to us by Dr. Edward Martin, Professor of Clinical Surgery, University of Pennsylvania. This experiment consists in immersing a strand of ordinary catgut in a solution of our silver salt, and afterwards making sections of the catgut. For this purpose the thickest piece of catgut obtainable may be immersed in a 1-per-cent. solution of silver vitelline over night; on the following morning section of the gut reveals that it is impregnated through and through with the silver. This is the severest test that can be made, and demonstrates that solutions of our silver salt have an intensely penetrating action on albuminoid structures, even when they are hard, tough and tightly compressed. The integrity or flexibility of the catgut are in no wise impaired by the immersion. The practical deduction from this experiment is that this salt will exert the antiseptic effects of silver in the deep submucous structures where, in most pathological

conditions, gonococci or other pathogenic organisms, find and maintain a lodgment in spite of energetic measures to eradicate them.

"Reasoning from its chemical and pharmacological attributes, our silver compound should be valuable in the treatment of genito-urinary diseases and in the various inflammatory affections of eye and nasal passages in which silver nitrate or one of its substitutes is indicated.

"It is safe to predict that silver vitelline will practically revolutionize the treatment of certain inflammatory diseases of the eye, such as ophthalmia neonatorum, purulent conjunctivitis, dacryocystitis, etc., in which silver is indicated and always employed, but in which a silver salt, which is freely soluble, penetrating to the deeper tissues, non-irritating, and, at the same time, containing a high proportion of silver, is regarded by oculists as a desideratum. Silver vitelline contains 30 per cent. of silver—about half the amount of silver nitrate; hence a 50-per-cent. solution of silver vitelline corresponds to a 25-per-cent. solution of silver nitrate, with greater penetrating action, but without the caustic irritating properties of the latter."

I can only add that, as far as I have been able to try it, this new silver preparation seems to fulfill in ophthalmic practice all that the authors expected.

I have used it in a 5-per-cent solution in a number of cases of chronic and subacute conjunctivitis, and in cases of trachoma after the removal of the granular tissue. It is non-irritating, causes no pain, and in every case its application has brought about a visible improvement. I have not used it long enough to know whether and in what time it is likely to cause argyrosis; but, on account of its extreme solubility, it may perhaps be less likely to bring on this disagreeable discoloration of the conjunctiva.

It is certainly worth an extensive trial.

THE RETINITIS ALBUMINURICA OF PREGNANCY.*

By DR. S. C. AYRES.
CINCINNATI.

THE occurrence of albuminuria in pregnancy is probably seen in only a small percentage of cases. It is very significant in its relations to eclampsia, and is looked upon with suspicion and even dread when associated with headache, œdema of the limbs, nose bleed and disturbance of the heart. As to its frequency, our distinguished colleague, Dr. Zinke, says it is variously estimated at from 2 to 20 per cent., but that from 10 to 15 per cent. would be the proper estimate.

While albuminuria occurs as above stated, the involvement of the optic nerve and retina is much less frequent. Dr. Zinke says: "Judging from the meagre reports of cases of albuminuric retinitis occurring during gestation, the manifestation of this complication appears to be exceedingly rare. In the twenty-seven years of my practice, and a record of 3,000 labor cases, I have not seen a single instance of albuminuric retinitis in pregnancy." Text-books in general say but little on this subject, which is evidence that writers and men of large experience meet the disease but seldom.

My own experience coincides with that of others, and yet when the optic nerve does become involved during gestation, it is a very grave and dangerous complication. I have seen several cases where total or almost total blindness resulted, and, again, others where the result has been more fortunate, and where the mother was restored to the enjoyment of sight. The observation of two cases observed recently, and two a few years ago, prompt me to bring this very important subject before the Academy, hoping to elicit the experience of its members.

Case I.—Mrs. X., primipara, æt. 34, who was pregnant about six months, noticed some impairment of vision—only a blurring and indistinctness. As albumin had already been detected in her urine, I was called in consultation, and with the ophthalmoscope found the following condition: In the right eye there was a patch of exudation above the optic disc and one below it, and six small spots near the macula, caus-

*Read before the Academy of Medicine, April 14, 1902.

ing a blurring of central vision. There was no optic neuritis. In the left eye there were two spots of exudation above and two below the macula, but not encroaching upon it, and hence not causing an impairment of central vision. On the outer side of the optic disc there was a broad, flame-like retinal hemorrhage. There was no optic neuritis, the nerve head presenting a normal appearance. Vision in the right eye was $^{15}/_{xxx}$, and in the left eye practically perfect. Her family physician was very much alarmed, and feared an increase in the retinal disease, and proposed a premature delivery. To this I could not consent, on the ground that the optic discs were quite normal in appearance, free from the haziness and blurring so characteristic of this disease. It was a mild case of retinitis, but *not* a neuro-retinitis. The patient was anxious to have her child come to full term, and the appearance of the retinæ did not justify any interference. She was put on judicious treatment to relieve the albumin. Her general health was good, and there were no headaches, so characteristic of Bright's disease. In the course of three weeks spontaneous premature delivery came on, and a dead child was born.

I examined the mother a few months later, and found vision in the right eye $^{15}/_{xx}$ and $^{15}/_{xv}$ in the left eye.

Case II. — Mrs. Y., pregnant about six months with fourth child. For some weeks she had noticed a gradual failure in vision of both eyes. Recently it had become so bad that it was with difficulty she did her housework. She could not read, and it was even difficult for her to recognize faces a few feet distant. Her physician, Dr. Trush, had already recognized the presence of albumin, and asked me to examine her. The ophthalmoscope revealed a very typical case of neuro-retinitis of severe type, with marked swelling of the optic discs, obscuration of the nerve heads, and numerous hemorrhages and exudations in the retina, extending over the retina as far as it could be seen. Vision was reduced to barely $^{15}/_{c}$ in each eye. If it continued to fail at the rate it had done recently, it seemed more than probable that in a short time she would be entirely blind in both eyes. The retinal condition was very serious, and the prognosis unfavorable unless the cause could be removed. This was fully ap-

preciated by her physician. My advice was to bring on premature labor, in order to save her from impending blindness. The long time before which normal delivery would take place would surely increase the gravity of the situation. This was fully explained, and the question left to her and her husband to decide. She very promptly, on religious grounds, refused the proposition. A week later nature very kindly came to her relief, and she had a spontaneous miscarriage. Three months later I examined her eyes again, and was gratified to find her vision very greatly improved, being $^{15}/_{xx}$ in each eye. She could read ordinary print without difficulty. The retinæ had not yet cleared up, some of the exudations were still visible, but the central portion of the retinæ around the maculæ was quite free, and central vision practically perfect.

Case III.—In Mrs. Z.'s case there were nine pregnancies. In the first three there were no eye complications. In the fourth she was blind for two weeks preceding delivery, but sight returned promptly afterwards.

In the fifth pregnancy her vision was bad from about three and a half months or until confinement. She also suffered constantly from headaches. After delivery vision became as good as usual.

In the sixth pregnancy sight was also bad from about the fourth month until full term, when it again recurred.

In the seventh pregnancy she suffered from headaches and sight was slightly affected.

The eighth pregnancy was followed by a miscarriage at two months—no eye symptoms.

In the ninth pregnancy she had a convulsion at about six and a half months, and was totally blind for forty-eight hours. Prompt and active treatment was instituted, but the fear of another convulsion and of further implication of the eyes induced her medical adviser to bring on labor at about the seventh month.

During each of these pregnancies, when the eyes were involved, there was albuminuria more or less abundant. Her vision was not estimated on these different occasions, except the last one, so that this report is not as concise as it should be.

In relation to the last pregnancy, I will say: I examined her July, 1890, after the last pregnancy. Vision was re-

duced to 0.1 in R. E. and 0.7 in L. E. There were characteristic alterations in the fundus of each eye, but more marked in the right eye, where there was a chorio-retinitis. There were numerous white patches in the retina of the left eye.

I examined her in April, after a period of twelve years, and find vision in the right eye perfect. In the left eye V= $^{15}/_{XL}$, but with +cyl. 0.75 ax. 110° V=1. This was very gratifying, as her vision, as above stated, was markedly reduced, especially in the right eye. The retinæ looked healthy and normal, and no traces of the patches were visible.

Case IV.—Mrs. S., examined August, 1893, gave the following history: Last April, when about three months pregnant, her sight very rapidly failed in both eyes. In May she had a miscarriage. It is now three months since this occurred, and I found vision reduced to $^{2}/_{cc}$ R. E. and $^{3}/_{cc}$ L. E. The retinæ showed characteristic changes in both eyes, with marked alteration in the macula luteæ. There was still some albumin in the urine. She was kept under observation for three weeks, and a tonic treatment ordered. Vision R. E. increased to 0.1 and in L. E. to $^{5}/_{cc}$. She has not been seen since.

Dr. E. G. Loring,* in 1882, was probably the first oculist to specifically recommend abortion to save the vision of the mother. He reports the case of a woman of thirty-five, who was pregnant for the third time. In the first confinement she lost partial vision of the left eye, and in the second pregnancy it was entirely destroyed, and vision of the right eye was reduced to one-third of normal vision. In her third pregnancy she applied to Dr. Loring for advice, and he recommended premature delivery. The operation was done, and vision was retained.

S. D. Risley† reports a case of retinitis albuminurica in a woman aged thirty-five, pregnant between four and five months. Vision was reduced to counting figures at two feet in right eye and to $^{10}/_{cc}$ in left eye. He advised an abortion, but to this she refused her consent on moral grounds. Dr. Risley says: "There were still more than four months before her gestation would naturally terminate. Long before

*Trans. Am. Ophth. Soc., 1882.

†Trans. Am. Ophth. Soc., 1886.

its completion, however, she would be hopelessly blind. If even her life were spared to the full time, she would then be exposed to the serious accidents which hang like a pall over the child-bed of an albuminuric woman." After consulting her spiritual adviser, she submitted to the operation. She had a very serious time, but finally recovered, and within a year was restored to perfect vision in the left and almost perfect vision in the right eye.

Van Vleet, in *Medical Journal*, 1891, reports four cases of albuminuria in pregnancy accompanied with retinitis, in three of which the termination was fatal, and in the fourth case a miscarriage fortunately occurred, and saved both the life and the sight of the patient. He strongly recommends the production of abortion in such cases.

Dr. Lucien Howe,* after stating that he had analyzed all the cases he could find published as far back as 1870, says these tend to show that where the vision begins to be impaired in the last two weeks of pregnancy, recovery follows immediately. Of those described as being in the eighth month or thereabouts when the retinitis commences, not one-half recovered, and several did not materially improve. Finally, when this began earlier than what was estimated, as the middle of the seventh month, when nature did not interfere by bringing on a miscarriage, and when the patient escaped with her life, it was only to remain blind forever afterward.

Dr. Robert L. Randolph says, in Bulletin No. 41, Vol. 5, *Johns Hopkins Hospital Bulletin:* "It is clear that much weight should be attached to dimness of sight occurring at any time during pregnancy."

Dr. J. E. Weeks† says: "Regarding the anatomical changes affecting the eye in albuminuria, it is safe to say that there is but little inflammatory action involved; there is but little infiltration of leucocytes and increase of nuclei, and very little hyperplasia of connective tissue, such as we would expect to find in so chronic a condition if true inflammation were present. Extravascular, the condition usually is simply one of the escape of the elements of the blood from the vessels, in mild cases the watery portion producing simple œdema."

*Am. Jour. Ophth., 1885.

†Archiv. Ophth., Vol. XVII.

"The escape of the elements of the blood from the vessels must of course be due to some influence that weakens their walls—an impairment in their nutrition. This may be produced by a change in the chemical composition of the blood or by a diminution in the supply by obstruction, etc., or both conditions may obtain at the same time." Under this category come the retinitis of pregnancy, scarlet fever and diphtheria. The retinitis associated with the contracting kidney presents different pathological changes. In the diseases just mentioned the retinitis passes off with the subsidence of the disease or with a premature delivery. In chronic Bright's disease there are marked changes in the arteries, due to endarteritis and periarteritis. There are also striking changes in the choroid, due to hemorrhages and exudations. These are characterized by the white patches in the choroid, circled, as they often are, by a ring of pigment.

It is probable that we may have to revise our opinions as above stated on the influence of albuminuria in pregnancy. Investigations on another line have been made and are being made which will materially overthrow the ideas which we have held for so many years. While they were not entirely satisfactory, yet they were accepted for want of a better explanation of the serious symptoms which the physician is called upon to face. The question of the diminished excretion of urea is not a new one, but it has recently been applied to the cases mentioned in this paper, with results which are rather startling as they are rational, and quite fully explain the phenomena present.

Dr. S. Marx (*Med. Record*, April 20, 1901), in a very interesting and practical paper on the "Toxæmia of Pregnancy," states that this condition arises, not from albumin, but from diminished excretion of urea. He states that many women with grave nephritic diseases go to full term with little or no discomfort. He further states that albumin and casts have no meaning for him in the presence of a normal urea excretion, for with that, he is in a position to know that sufficient of the effete products are being excreted, and the condition of the safety valve in the engine of the body is evidenced by the behavior of this element.

"Whether this urea is really the offending agent or not,

modern investigation does not allow us to state with any degree of positiveness. It is enough to this end to state that when there is a lessened secretion the patient suffers, and when hypersecretion occurs the patient is freed from those symptoms indicative of toxæmia."

His conclusions are as follows:

"1. Toxæmia of pregnancy is a complex condition depending on more than one factor.

"2. Women go to term with albuminuria without symptoms referable to toxæmia. When such symptoms arise, they are not caused by the albumin present, but by faulty urea secretion.

"3. In the most desperate and malignant cases there is found neither albumin nor casts.

"4. Urea is always found markedly diminished in the so-called toxæmia of pregnancy or urinæmia.

"5. Finally, I make a strong plea for a regular and methodical course of urea estimation in all cases of toxæmia, or for the relegation to secondary importance of the time-honored examination for albumin.

"6. Progressive diminution of urea secretion, with or without albuminuria, is the sole indication for the induction of premature labor, which is especially indicated when conscientious medical treatment fails."

Dr. E. E Morse, Washington, D. C., in the April number of the *American Journal of Obstetrics*, in an article on "Albuminuria in Pregnancy," covers the period pro and con in relation to the question of albuminuria in eclampsia. He says that "Gerster has collected a series of 108 cases, all eclamptics, in which, after repeated and careful examinations, no albumen was found at any time. In fact, the very worst cases are those in which eclampsia appears without a sign of albuminuria." He endorses the theory of Dr. Marx, above quoted, and says: "Repeated and careful examinations have shown that there exists a close relationship between the amount of urea eliminated and the development of toxin poisoning."

In view of the positive and well-founded opinions of Dr. Marx, it is very important that estimates of urea be made in these cases to determine whether it may be the offending

and toxic substance or not. If his statements should be proven true, it will be a great step in advance, and will enable us to more successfully combat a much-dreaded foe. I earnestly commend it to your consideration, and hope that investigations on this line will be made in every case.

A question of momentous importance presents itself to every pregnant woman who, with rapidly advancing blindness, weighs the situation calmly. She may have one or more small children, who demand and are entitled to her care and attention. She must also consider her husband, who is liable to have a blind and helpless wife unless she gets relief. There is also a menace to her own life, for we know too well how often convulsions come on before full term has been reached, and she has to pay the dread penalty. This is a very serious aspect of the question, and should be weighed very carefully in giving advice. Is the life and sight of the mother of more importance than the unborn child or not?

The time when retinitis comes on varies very greatly. It may occur as early as the second month, and, again, not until the seventh or eighth month. The earlier it comes on the more unfavorable the prognosis as to sight.

Premature delivery in not indicated in all cases by any means. Where it comes on late, every effort should be made to tide over the period, at least until the child is viable. Much will depend upon the condition of the retina. Where the retinitis is severe, involving both eyes, as it generally does, and where sight is seriously impaired, the chances of total or almost total loss of vision are very great. In the first case I here reported there was a retinitis pure and simple, without any involvement of the nerve head. Here any interference would have been unwarranted. Generally the nerve head is involved more or less, and we have a neuro-retinitis. In the second case there was a neuro-retinitis with numerous exudations scattered over the entire fundus, with hemorrhages in the retina. The macular region was so much involved that central vision was seriously impaired, as well as the peripheral. With nearly three months more to run, it seemed more than probable that before normal delivery could take place the sight would be practically destroyed. In these cases the optic neuritis is followed by atrophy.

In the third case a miscarriage was brought on during the

pregnancy, and the result was favorable, both to the sight and the life of the patient. Had this not been done, in all probability her sight would have been seriously damaged. It is to be remembered that the impairment of vision is not always a guide to the extent to which the retina is involved. If the macula is not attacked, there may be extensive invasion of the retina by the disease and yet central vision remain good. I had a striking example of this a few years ago in a gentleman who had chronic Bright's disease and marked retinitis, but the macular region was not involved, and his central vision was excellent. Patients do not complain of their eyes until the central portion of the retina is invaded, and failing sight is often the first warning that the patient has that the kidneys are diseased at all.

The prophylaxis in these cases is plain enough. Every physician who agrees to attend a confinement should at intervals examine the urine. If albumin is detected, proper hygienic and internal treatment should be instituted and carried out. This disease often occurs in women who are apparently in excellent health. Œdema of the limbs is not always present. Headache, which is one of the prominent symptoms, is not always severe, and is often attributed to gastric and intestinal disorders or to her pregnant condition. Constipation should be relieved by mild laxatives, enemata and properly regulated diet. If there is a diminished excretion of urea, proper therapeutic and hygienic measures should be instituted to restore the usual quantity.

My conclusions are:

1. The urine of pregnant women should be examined at intervals for albumin, and the quantity of urea should be estimated.

2. Even slight visual disturbances should be followed by an ophthalmoscopic examination of the eyes.

3. When there is a well-marked neuro-retinitis in the earlier period of pregnancy, up to the end of the sixth month, the prognosis for sight is unfavorable.

4. When the retinitis comes on in the last three months of pregnancy every effort by suitable internal and hygienic treatment should be made to tide the case over to maturity.

5. The occurrence of convulsions with retinitis is an indication for interference.

CORRESPONDENCE.

Editor AMERICAN JOURNAL OF OPHTHALMOLOGY:

Dear Sir:—In the AMERICAN JOURNAL OF OPHTHALMOLOGY, September, 1902, there appears an abstract of an article published by me in the *Therapeutic Gazette* for July 15, entitled "The Supra-Renal Gland and Its Preparations in Ophthalmic Practice." In this abstract I am made to say that I have found the suprarenal preparations of value in the treatment of a number of affections, for example, blepharospasm, spring catarrh, trachomatous pannus and vascular keratitis. Now, in point of fact, I was most particular when summarizing the advantages which have been claimed for these preparations, to state that this summary resulted from an examination of the published literature, and wherever possible I placed in brackets the name of the author who recommended the suprarenal gland or its preparations for any particular condition, quoting thus: Radziejewski, Perret, von Reuss, Darier, Bates and Reynolds. I expressed my personal views as follows: "Many surgeons, like Adolf Alt, for example, who have largely used adrenal preparations, while perfectly agreeing in regard to their remarkable effect in producing anæmia of mucous membranes, have failed to observe any therapeutic value. This has been my own experience; that is to say, the gland preparations or principles do not seem to be curative in the true sense of the word, although there can be no question that they favorably modify diseased processes under certain circumstances and are of great value in aiding the action of other remedies, or, more accurately, in paving the way for their action." I shall be much obliged to you if you will publish this letter, and correct by its publication the impression which your abstract gives that I am a believer in the therapeutic value of adrenal preparations in a number of diseased conditions, in some of which I have not even used the remedy and in others of which I have seen it signally fail.

Yours very truly,

G. E. DE SCHWEINITZ.

MEDICAL SOCIETIES.

THE SEVENTIETH MEETING OF THE BRITISH MEDICAL ASSOCIATION.*

Held at Manchester, July 29th to August 1st, 1902.

SECTION OF OPHTHALMOLOGY.

Dr. Glascott, Senior Vice-President, in an opening address, announced that the President had unfortunately been prevented by illness from attending the meeting, and sketched the progress of ophthalmology in Manchester.

Mr. Marcus Gunn then opened a discussion on "Functional Derangements of the Eye," and described in detail the various symptoms connected with these cases, and gave also descriptive cases.

Mr. Holmes Spicer described a case illustrating the pupil reactions.

Mr. McGillivray said that in Dundee these cases were exceedingly rare.

Mr. Hill Griffith thought that when one was certain that the case was a genuine one there was not much difficulty in deciding whether it was functional or organic.

Mr. Doyne described a case due to injury, which ultimately turned out to be one of tobacco amblyopia in addition.

The President thought that in England these cases were not so uncommon as most people thought, and described a case in which there was no perception of light, but which recovered with a placebo.

Dr. Karl Grossmann described a case of ivory exostosis of the orbit upon which he had operated and had observed for eighteen years. He showed the large masses of bone removed, and also the patient.

Major M. T. Yarr, R.A.M C., described two cases of indirect gunshot wounds of the eyes which he had seen in South Africa. In one case the man was shot through the face, and, in spite of there being no injury to the orbits, yet a condition very like retinitis proliferans was produced. In the second case pigmentary changes about the macula were the only causes seen to account for defective vision.

*British Medical Journal.

Mr. Bishop Harman mentioned cases due to the concussion from an exploding shell.

Mr. Lee described two cases he had seen.

Dr. J. A. Menzies described some cases of detachment of the corneal epithelium, and gave a sketch of the literature as well as of several cases. He recommended for their treatment removal of the loose epithelium and scraping of the surface of the cornea.

Mr. Devereux Marshall objected to the use of cocaine.

Mr. Simeon Snell had performed peritomy with good effect.

Mr. Holmes Spicer thought the disease was herpetic in origin. In one case he had done iridectomy with good effect.

Mr. Doyne dreaded these cases, as relapses were so frequent. He had done iridectomy, but preferred the galvanocautery.

Mr. McGillivray had one patient who, although she did not suffer from myxœdema, yet kept free from relapses so long as she took thyroid extract.

Mr. Harman had seen a similar condition in fishes.

Mr. Charles G. Lee read notes on some cases of monocular neuritis. He thought that the cause was local and not general.

Mr. Hill Griffith and Mr. Doyne thought that most they had seen were due to a retro-ocular neuritis.

Mr. Simeon Snell described a "Method of Suturing the Tendons After Enucleation of the Eyeball," as this produced a more satisfactory stump.

Mr. Ernest Clarke and Mr. E. Roberts also described methods they had introduced.

Dr. Karl Grossmann thought that the introduction of glass balls was unsatisfactory, as they so frequently came out later on.

Dr. Edridge-Green proposed a resolution on the Holmgren test for color-blindness, which was not carried.

Thursday, July 31st.

A discussion on the "Treatment of Sclero-Keratitis" was opened by Dr. A. W. Sandford. He discussed the etiology of the disease, and for treatment he thought that the hypo-

dermic injection of pilocarpin was very useful. For most simple cases myotics were better than mydriatics. He had not seen much of the treatment by means of subconjunctival injections; at any rate, he had seen no better results from this than from other methods of treatment, while the reaction produced was often very much greater than desirable.

Dr. Maddox thought that the dry heat was the most useful; this, however, was difficult to apply by the ordinary methods. For this purpose he had made a fine coil of tinned wire sewn on to flannel. This was connected with an accumulator or through a transformer to the main, and could be worn for any number of hours.

Dr. Hill Griffith thought Dr. Sandford was optimistic. He thought these cases most intractable. He was not hopeful of the action of any drugs or of the operation of peritomy.

Mr. Devereux Marshall believed that in nearly all cases atropine was the best drug to use locally, as at least a blotched pupil would properly be avoided, whereas if myotics were used this would be likely to add to the complications of the disease.

Mr. Wray considered that atropine should be pushed in the form of ointment used after cocaine.

Mr. W. Watson Griffin described a case, and Mr. Harman mentioned a case in which adrenalin was used, and although it greatly improved the appearance of the eye, yet it caused pain and diminished the vision, though there was no increase of tension.

Dr. Clegg said he chiefly used 1 to 6 per cent. of yellow ointment.

Dr. Glascott said he chiefly relied on mercury and atropine ointment locally, and the correction of the refraction was most important.

Dr. Sandford, in reply, said that in many cases atropine was indicated, but he thought the hypodermic injection of pilocarpine was very useful. He did not think that peritomy was very useful.

Prof. J. Widmark demonstrated Martin Janson's siderophone for the detection of iron within the eye.

Mr. C. Wray read an elaborate paper on "Civilization and Eyesight."

This was followed by another paper by Professor Widmark on the "Etiology of Myopia."

Dr. Maddox discussed both papers.

Colonel E. F. Drake-Brockman gave his experience in India, in which with the increase of study in the colleges there was a very large increase in the number of cases he had to treat for myopia.

Dr. Hill Griffith congratulated Mr. Wray on his paper. His experience was that cases of hypermetropia remained as such, and did not develop into myopia.

Mr. Doyne said he was astonished to hear Dr. Griffith's experience. He thought it was the commonest thing to see hypermetropic cases become less so or even myopic.

Mr. Story suggested that there always were plenty of myopic cases in India, but that, until they came to study much, it was neglected.

Mr. McGillivray was convinced of the tendency there was for hypermetropic cases to become less marked.

Mr. Holmes Spicer also agreed.

Mr. Wray replied.

Dr. D. McKeown read notes of a case of ulceration of the cornea of an intractable nature. Also notes of a partial dislocation of the lens, in which he had needled both. In one the lens had become opaque, and in the other it had absorbed. Good results were obtained in both cases.

Friday, August 1st.

Dr. James Taylor opened the discussion on the "Rarer Forms of Optic Atrophy." He went into the question of atrophy occurring in general paralysis, disseminated sclerosis, toxic amblyopia, pressure on the chiasma, hemiplegia, and in various anomalous cases without any obvious cause. He thought that there was a great tendency to assume that every case occurring in smokers was of a toxic nature, whereas many so-called toxic cases were really caused by the early stages of some disease of the central nervous system. In all such cases the urine should be examined, for certainly diabetic patients seem especially liable to get amblyopia when little or no tobacco was used.

Mr. Holmes Spicer had also noticed and recorded cases occurring in diabetes; he thought that it was most difficult to get some men to own up to smoking in excess, and he really

thought that many of the cases in which no history was obtainable were due to this fact.

Dr. Emrys Jones mentioned those rare cases of atrophy associated with flow of fluid from the nose. He quite agreed with Mr. Spicer as to the difficulty of obtaining satisfactory histories.

Dr. Hawthorne said he would not diagnose atrophy by the appearance of the disc alone, but the vision and fields also should be taken into consideration.

Dr. Bronner thought the color fields were most important.

Dr. Newton Pitt said that the pathology had not been worked out, for seldom if ever had a case, which had been seen and examined clinically, been examined later on pathologically.

Mr. Parsons said that several had lately been fully examined.

Dr. Clegg thought that the color of the disc gave but very little information as to the amount of atrophy.

Mr. Harman was of opinion that the degeneration started from the retina and traveled backwards.

Dr. Hill Griffith had seen many toxic cases in women due to tobacco. Females were especially liable to be affected by the drug.

Remarks were also made by Dr. McGillivray and Dr. S. Lodge.

Dr. Taylor briefly replied.

Dr. Sam Lodge read a paper on "New Vasomotor Disturbance of the Eye," in which there was a transitory œdema of the eyelids, dilatation of the episcleral vessels, and enlarged thyroid, occurring in neurotic subjects. He showed photographs and described cases.

Mr. Parsons gave a lantern demonstration on degeneration in the optic nerve produced experimentally in monkeys as the result of injury to certain parts of the retina.

Dr. Adolph Bronner read notes of forty cases of high myopia in which the lens had been removed. He greatly advocated the operation, and had had excellent results even in those in which only one eye was myopic with signs of amaurosis, while the other was normal. He had seen detachment of retina follow in some cases.

Mr. Devereux Marshall thought it a very risky thing to operate in monocular cases with a normal eye on one side, for sympathetic inflammation was still possible, even if it were rare; and he could not see what benefit the patient would derive from the operation.

Mr. Hill Griffith had seen glaucoma come on after a secondary needling of the capsule in these cases.

Mr. Spicer had had gratifying results, though these patients did not seem to get on so well with both lenses removed as when only one was touched.

Mr. Ray wondered if some of these gratifying results were not obtained in eyes which really had posterior lenticonus and not true myopia. He had operated on such with great benefit.

Mr. Lee also spoke.

Dr. Bronner replied.

Dr. Edridge-Green proposed that a committee be appointed to inquire into the best methods for testing for color blindness, as he considered the Holmgren test most unsatisfactory.

This was seconded by Dr. Lodge and carried.

FIFTY-THIRD MEETING OF THE AMERICAN MEDICAL ASSOCIATION.*

Held at Saratoga Springs, N. Y., June 10 to 13, 1902.

SECTION ON OPHTHALMOLOGY.

(Continued from last issue).

FOURTH SESSION.

Address of Chairman of Committee on Exhibit of Early American, British and Colonial Ophthalmologic Literature.

Casey A. Wood (Chicago) said it was impossible to divorce ophthalmic from general medical literature. The Greek schools derived much of their knowledge of ocular therapeutics from the Egyptians; in the ancient Nile region there were "eye doctors." From the Greek school the Roman oculists arose, followed by the Arabian ophthalmologists. He

*American Medicine.

referred to the work of Bartholomew Traheron (1543), in which cataract was referred to as a "slimy humor coming about the apple of the eye." The first separate and complete treatise on the eye in English was by Richard Banister, who early observed the hurt done to inflamed eyes by the application of astringent remedies. In the exhibit is a first edition of Newton's book which played an important role in the knowledge of ophthalmology. One of the best known surgeon oculists of the eighteenth century was Thomas Woolhouse, followed by his pupil, John Taylor; the former was the author of many books on the eye, and the first to suggest the possibility of making an artificial pupil. In 1759 William Porterfield published his masterly treatise on the eye, and in 1743 William Rowley published a work illustrated by plates made from engravings on steel and copper. John Ware, who died in 1816, wrote many books on ophthalmology. At first the British and French ophthalmologists were best known, but were shortly eclipsed by the German surgeons. Then appeared that greatest of all text-books by Wm. Mackenzie. The first complete work published in America was by John Saunders, who was the first to establish a hospital for eye diseases. The first text-book by an American writer was that of Geo. Frick. Americans early begun to push forward the car of ophthalmologic progress. Isaac Hays, the first editor of the *American Journal of Medical Science*, was a voluminous writer on ophthalmic subjects. The first Canadian treatise was by Henry Howard of Montreal, in whose work there is a description of removal of a cataract with an arrow-headed knife. In concluding, Wood called especial attention to the excellence of the text-book by Wm. Mackenzie and said there was not to-day a more accurate account of external diseases of the eye.

Neuroepithelioma Retinæ (Glioma), with Report of Cases; Illustrated.

C. R. Holmes (Cincinnati) reviewed the history of the subject and considered the question of whether or not this class of tumors should be classified with the sarcomas. He considered the macro- and microscopic appearance and differential diagnosis. He said no case had yet been recorded

where the disease had traveled from one eye to the other—that although both eyes are affected in a large percentage of cases, the disease starts independently in each eye, a fact he considered of interest inasmuch as it would argue in favor of double enucleation to preserve life if performed early. He then discussed several cases in detail.

Discussion.—KNAPP (New York) reported three cases bearing on the subject.

WEEKS (New York) spoke of the involvement of mesoblastic tissue in these tumors and thought the term gliosarcoma particularly applicable.

AYERS (Cincinnati) referred to a case in which nine years had elapsed since the enucleation and patient was in good health.

BAKER (Cleveland) spoke of the difficulties of diagnosis, and said several weeks ago he had enucleated an eye which he and several other oculists had called glioma, but which the pathologist said was not glioma.

JACKSON (Denver) referred to a case he had had recently in an adult where the appearances were such that had it been a child he would have been led to make a diagnosis of glioma.

PYLE (Philadelphia) spoke of a case in which diagnosis of glioma had been made and on enucleation it was found to be a subretinal cysticercus.

RISLEY (Philadelphia) said there was often great difficulty in diagnosis and the child should be given the benefit of the doubt always.

DETACHMENT OF THE RETINA.

R. L. RANDOLPH (Baltimore) had been impressed with the results obtained by Dor, Winselmann and others with subconjunctival injections of salt solution, and recited two cases in which he had put the treatment to the test, and in which it was undoubtedly beneficial. He thought the tendency of the method was to do good.

Discussion.—HOLMES (Cincinnati) spoke of the operative treatment of these cases, and said the results had not been very brilliant.

KNAPP (New York) spoke of the benefit of irodectomy in secondary complications, and said the eye might often be preserved with partial detachment.

Risley (Philadelphia) thought the salt injections had a tendency to do good, and said he had seen the retina reattach itself, but that always the detachment recurs.

The Disappearance of Opacities of the Crystalline Lens.

Walter Pyle (Philadelphia) briefly reviewed a previous paper on the spontaneous disappearance of senile cataract, and spoke of the artificial production and dissipation of lenticular opacities and of the disappearance of opacities after traumatism. He said there is no question of the authenticity of many reports of the spontaneous disappearance of senile cataracts; that it is not uncommon for opacities as a result of traumatism to disappear, even when the capsule has been penetrated. He said too much stress could not be laid on the value of personal hygiene, treatment of local disorders, careful refraction and proper use of the eyes in arresting the progress of incipient cataract; in certain cases secondary to nutritional disturbances, opacities might disappear under proper treatment. The non-operative treatment of cataract, as practiced by charlatans and irregular physicians is worthless, dangerous and consists of no beneficent measures not known and properly used by all reputable oculists.

Discussion.—Black (Milwaukee) reported for Würdemann three cases of lenticular opacities which were absorbed or greatly improved by treatment, which consisted of rest, atropin, alteratives—mercury and arsenic—and regulation of diet.

Taylor (Wilkesbarre) said that undoubtedly many cases remain stationary or vision slightly improves, and that in some cases the opacities do entirely disappear.

Appleby (St. Paul) recited a case in which opacity of the lens produced by a foreign body had cleared up and the patient had vision of $^{20}/_{30}$.

Standish (Boston) said the cases of injury by foreign body followed by clearing up of the opacity were only when the foreign body was exceedingly small and the wound a minute one; when a lacerated wound is made the lens is doomed.

FIFTH SESSION.

The Anatomy of the Ocular Muscles and Their Accessory Structures.

J. Elliot Colburn's (Chicago) observations were based upon the study of two hundred cases examined for errors of refraction. He said the size and mobility of the eyes seems to vary with the size, shape and position of the orbital cavity and its relation to the plane of the face; there is a direct relation between the angles of the base of the orbits and the facial plane. He considered three types, the emmetropic, hyperopic and myopic. The orbital apices were nearer together in the myopic type. The facial plane was determined by a line drawn through the attachments of the tendo oculi and orbic. palp.; the plane of the base by drawing lines from these points to outer angles of orbits. He considered the anatomic differences in the development of special types. Hyperphoria occurs most frequently in unsymmetrical orbital planes, the direction of the error following the most marked displacement.

The Physiology of the Ocular Muscles.

E. C. Ellett (Memphis, Tenn.) referred to the planes of reference and rotation and axis of rotation, and spoke of the need of a definite and accepted nomenclature of the ocular movements, with suggestions for such a table. He said that rotation about the anteroposterior axis never occurs in a normal eye, and that "false torsion" does not exist.

Principles Controlling Operative Interference in Heterophoria.

E. J. Gardiner (Chicago) advised thorough examination of the patient and exclusion of errors of refraction with repeated tests of muscular imbalance with careful regard for the power of each muscle. Correction of the ametropia and anisometropia may be all that is required. It should be determined whether the defect depends on the predominance of one muscle, or upon weakness of the opposing muscle and whether the condition is inherent or induced. He thought orthoptic exercise and electric treatment should precede operative measures. He said if in doubt don't operate.

Principles Controlling Non-Operative Treatment of Heterophoria, Including the Use of Prisms and Prism Exercise.

S. C. Ayers (Cincinnati) spoke of the frequent occurrence of heterophoria in girls and boys who are physically not well developed, but are often strumous and ill-nourished; in girls just before the menstrual function develops and in boys about puberty. He said more regard should be paid in the public and private schools to the differences in physical and mental vigor. Much can be accomplished by the correction of the ametropia, the judicious use of prisms and freeing them from the restraints and exactions of school life. Operative measures should not be resorted to until all other resources have been exhausted. We cure esophoria and convergent strabismus by proper adjustment of glasses, though it takes months and years to do it. We should give the weak interni the same chance we give the weak externi.

Discussion.—Risley said that it came down to this, that the man who got the best results was the man who had the widest knowledge and best judgment, and referred to the importance of taking into consideration the various reflexes, and cited various disorders as causative, pelvic troubles being a frequent factor.

Bates (New York) called attention to the value of the tropometer in these cases.

The Principles Controlling Operative Interference in Strabismus.

Edward Jackson (Denver) said that two kinds of structures share in determining the positions of the eyes—neuromuscular and connective tissues. The latter may determine the position for a time, but the former ultimately predominate. The capacity for hypertrophy under the proper nerve influence is the most distinctive characteristic of muscular tissue. Hence a muscle is too strong or too weak, according to the nerve impulses it receives. The function of a particular eye muscle is not to effect a single movement of the eyeball, but to take an appropriate part in almost every ocular movement. Its importance as a secondary rotator in effecting certain movements comes to its importance a primary

rotator for other movements. He then considered the various operations for the correction of strabismus.

Principles Controlling the Non-operative Treatment of Strabismus.

George M. Gould (Philadelphia) refers to his suggestion, made in 1893 at the Pan-American Medical Congress, and more fully set forth in articles in the *Medical News* of October 4, 1893, and November 18, 1892, that heterophoria is an innervational disease, and that therefore surgery is not applicable or genuinely curative. A reaction against operation has taken place, and a similar one is looked for as to operation in strabismus, because strabismus is preceded by heterophoria, during which it is curable without operation. Chronic or permanent strabismus is also preceded by a stage of acute, functional or incomplete strabismus, during which the reinstatement of binocular vision without operation is not impossible. The peripheral mechanism in strabismus is not primarily at fault. All myology resolves itself into neurology. The non-operative treatment consists in:

1. Prophylaxis.
2. The treatment of ametropia.
3. The treatment of heterophoria.
4. The treatment of amblyopia.
5. The treatment of physiologically curable strabismus.
6. The treatment of alternating strabismus.
7. The treatment of anomalous cases.
8. The treatment of incurable cases.

Prophylaxis consists in instruction of the public and of the parents as to the prevention of strabismus by placing the care of the child in the oculist's hands from the age of one year on. Anisometropia and strabismus are the two great causes. Glasses from about the age of two years will prevent strabismus. They can be prescribed by retinoscopy alone. The treatment of heterophoria was descibed in the author's paper before the section last year, and the treatment of amblyopia in the *Medical News* of December 31, 1892. All cases are physiologically curable if taken in hand early enough. The treatment of alternating strabismus is exceptional, and in anamolons and incurable cases operation is not advised, as the results are not real and permanent cures.

Discussion.—Black (Milwaukee) spoke of the non-development of the fusion center as a factor in these cases, and said it was well to first find out the degree of fusion of the eyes, and then proceed to refraction under mydriatics. He then referred to the value of the ambuloscope.

Stevenson (Akron) said the first thing to be done was to determine the conditions at rest, and said the great reason we had so much trouble with the external ocular muscles was due to the amount of close work and the convergence necessary. We should not only use the Maddox rod for distance, but should determine the condition of near work, too. He had used the ambuloscope with considerable success.

Valk (New York) did not think it would be proper to condemn a pretty child to go on for years with one eye turned in, with the hope that some day by exercise it would turn out properly. It is not fair to the child.

Risley (Philadelphia) said binocular vision was a matter of experience: it is acquired as are other things in life. He could relate many instances of persons removed from invalidism by tenotomy, after other means had been exhausted.

Gardner (Chicago) believed there were many cases in which nothing short of tenotomy would be of benefit.

Jackson (Denver) said the elasticity of the muscles on a given day might depend upon the innervation of preceding days; they vary in their length and in their strength. He thought there was no more reason to suppose that the excessive action of the internal rectus, for instance, is related to some peculiar shape of the bones of the orbit than to suppose that thickness of the biceps is due to the shape of the humerus.

(Continued in next issue.)

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. SHOEMAKER, M.D.
ST. LOUIS, MO.

SOME CONSIDERATIONS ON THE HYGIENIC AND PROPHYLACTIC TREATMENT OF MYOPIA.

Alexander Duane, (*New York Medical Journal*, June 8) makes the following points:

1. Making the patient employ the full correction of his myopia all the time, both for distance and near. This is of prime importance in all varieties of myopia, low, medium and high, and, if applied early, may check the progress of the myopia altogether.

2. Proper attention to illumination, the size and legibility of the print, the quality of paper used in the books read, the relative height and disposition of the seat and desk, and the many other factors that have been brought out by the zealous investigators into the subject of school hygiene. These are important but subsidiary matters.

3. In low and medium myopia, moderate restriction of near work, or rather its better distribution, so that it is done mainly by daylight and not for too long at any one time. Furthermore, momentary rest of the eyes at frequent intervals during the work. These rules to be the more strictly enforced the higher the myopia and the younger the patient.

4. In high myopia with evidences of progress, much more stringent restriction of near work. Open-air work to be encouraged and the adoption of confining and eye-taxing occupations forbidden.

5. In medium and especially in high myopia, plenty of sleep and out-of-door exercise.

6. Re-examination of the patient at frequent intervals (which in the case of high myopia should be very frequent), to determine how much the myopia has increased. If it has increased, the glasses should be increased also up to the full strength, and the hygienic regulations above detailed modified accordingly.

IMPLANTATION OF A GOLD BALL FOR BETTER SUPPORT OF AN ARTIFICIAL EYE.

L. Webster Fox, New York, (*Medical Journal*, January 18th), recommends his last operation and gives the technique as follows: If operation is to be performed on the right orbit, the eyelids are kept apart by a speculum, the conjunctiva is then grasped up and in above the inner canthus and the tissues are well pulled out. He then passes a Beer's knife or a curved keratome through the tissues, somewhat obliquely and well down into the orbit; this opening must be made large enough to push the globe in the space behind the tissues, conjunctiva, etc. This starts the opening which he enlarges with curved scissors, separating the tissues from the cellular tissues around the orbit, thus giving him a large pouch into which the globe can be inserted. He uses at present a gold ball of 11, 12, 13 and 14 mm. in diameter. The gold ball is inserted through the opening and retained in place by a shell which has to be modeled after an artificial eye and which he calls a "conformer." He has chosen three sizes for various orbits. He closes up the incision with two stitches and then places the conformer over the buried ball, and by gentle manipulation on this metal rotates the ball into place. The circular opening in the conformer allows the gold ball to fit the space which will be covered by the cornea of the artificial eye. The eyelids are then closed over the conformer which is left in place 24 hours. The eyelids also help to keep the ball in place. The conformers are made of metal gold plated. He states that the results obtained by this method are perfect; no secondary trouble follows, all healing up by first intention, and the two stitches are taken out the third day. If the operation is to be performed on the left orbit the incision is made up and out above the external rectus muscle and the dissection carried out as described above.

WHOLESALE IMPORTATION OF TRACHOMA.

Eighty-five cases of trachoma were found among the steerage passengers of the French liner steamship La Gascogne and the Red Star liner Zeeland, which recently arrived at the port of New York. The persons affected were mostly Syrians, Roumainians and Austrians. The only penalty for such importation, at present, is deportation at the expense of

the lines, but under the proposed new emigration act, which, unfortunately, has not yet become a law, a large fine may be imposed upon any company bringing diseased passengers to this port.

SIX CASES OF EPILEPSY DUE TO AMETROPIC EYE STRAIN.

Geo. M. Gould (*American Medicine*, July 5) does not agree with those who believe that muscular imbalance can cause epilepsy. He does believe that ametropia is occasionally the cause, and cites six cases in which prompt relief from all symptoms was experienced as the result of wearing the proper glasses. In addition to these cases the author has given partial relief to a great many cases, especially of petit-mal. His conclusions are as follows:

1. That undoubtedly eye strain is not the most common, and perhaps it is a relatively uncommon cause of the disease.

2. That however seldom it may be the cause it should not be neglected, on account of the terrible mystery and incurability of the dread affection.

3. That the relief of eye strain is far from certain by the prescribing of glasses, even by the most reputable of oculists, because there are a hundred ways in which the prescription may not be correct, the glasses improperly worn, or the ametropia quickly changed.

INSERTION OF A RABBIT'S EYE WITHIN THE CAPSULE OF TENON.

Felix Lagrange (*Annals d'Oculistique*, March and November, 1901) reports eleven cases in which he has performed this operation, and gives a photograph of one. In ten cases no trouble was experienced; in one the eye selected was from an old rabbit and was too large for the capsule. The author considers his method of prosthesis the best yet suggested. He recommends:

1. That, as each rectus is cut, a thread be passed through it to prevent its retraction.

2. Following enucleation, that the eye be not inserted until all hemorrhage has ceased.

3. That an eye of a young rabbit be selected.

4. That the opposite muscles be drawn into apposition by appropriate sutures.

5. That the sutures in the conjunctiva be close together and be allowed to remain a week.

6. That the most careful antisepsis be carried out.

REMOVAL OF GUNPOWDER STAINS.

E. G. Corbett (*The Medical World*, February, 1902) has succeeded in removing gunpowder stains from the conjunctiva and cornea, by first removing the powder and then using a fifteen per cent. solution of hydrozone in the eyes. (How often it was used the author does not state). For the face he uses a fifty per cent. solution applied constantly. This he uses for two weeks, and then paints the parts twice daily with equal parts of hydrozone and glycerine until all stains are removed.

EMPYEMA OF THE ANTRUM OF HIGHMORE WITH PTOSIS AND DIPLOPIA.

Heber Nelson Hoople (*Medical Record*, June 28) reports the case of a draughtsman, aged 21, and previously healthy, who, on account of poor vision, was almost completely disabled. Examination revealed incordination of the extrinsic eye muscles, diplopia, impaired vision, impaired accommodation and double ptosis. The antrum of Highmore was found full of pus; it was drained and properly treated. All eye symptoms promptly disappeared.

MISCELLANEOUS.

THE ORIGIN OF A VISUAL IMPULSE.

By F. W. EDRIDGE-GREEN, M.D., F.R.C.S.

The following remarks were made at the Section on Physiology of the recent meeting of the British Medical Association:

Dr. Edridge-Green said that light falling upon the retina liberated visual purple from the rods, and a photograph was formed. The decomposition of the visual purple by light chemically stimulated the ends of the cones, and a visual impulse was set up, which was conveyed through the optic nerve fibres to the brain. He assumed that the visual impulses caused by the different rays of light differed in

character just as the rays of light differed in wave-length. In the impulse itself we had the physological basis of light, and in the quality of the impulse the physiological basis of color. He assumed that the quality of the impulse was perceived by a special perceptive centre. Color was, according to this hypothesis, a point of difference perceived by a special centre independent of the visual centre, but closely connected with it.

He had examined the retinæ of several monkeys, and found visual purple in the yellow spot, which changed color when exposed to light. It was exceedingly difficult to see the visual purple in the yellow spot, except under a microscope, because of the very bright yellow pigment which pervaded it. The fact which had always prevented the visual purple from being accepted as the visual substance was that it had not been found in the cones, and that the most sensitive part of the retina, the fovea, contained only cones. But, according to the hypothesis which he proposed, it would be essential that there should be no visual purple in the cones, as these were sensitive, not to light itself, but only to changes in the visual purple. He had made many experiments to show that light might fall upon the fovea without producing any sensation whatever. Helmholtz mentioned the fact, and also stated that it was remarkable that a perceptible interval elapsed before we saw with the yellow spot, the fovea being the last point to convey a sensation of light. This would be explained by the diffusion into the yellow spot of the visual purple. All the facts of color-mixing, contrast, and after-images were consistent with the hypothesis that the visual purple was the visual substance.

He then passed to the perception of color by the brain, and this portion of the hypothesis was supported in the minutest particular by the facts of color blindness. Cases of color blindness might be divided into two classes. In the first class there is light as well as color loss; in the second class the perception of light was normal, but there was a defect in the perception of color. Both these classes were represented by analogous conditions in the perception of sounds; the first class by those who are unable to hear very high or very low notes; the second class by those who possess what is commonly called a defective musical ear.

All the facts pointed to the view that the sense of light was developed first, and then the sense of color, those rays which differ most physically being the first to be differentiated. In the course of evolution all the varieties of psycho-physical color blindness have been passed through.

The existence of a separate color-perceiving centre was supported by many pathological facts; several cases had been reported, in which the perception of color was abolished, whilst the perception of form and light remained unaltered. All objects appeared of different shades of gray, as in a photograph. In each case disease of the brain had been found. A similar condition could be produced by hypnotism. He had examined a case of general paralysis, in which the color vision became more defective as the disease progressed: also a girl who had become totally color blind, apparently from cerebral disease. Her color-perception slightly improved, and then she was able to recognize the extreme red and violet with one eye and red and blue with the other, the intermediate colors with both eyes being seen as gray. Violet was non-existent either as color or light to the eye which saw red and blue.

It was obvious that if the theory of the omission of a set of fibres did not explain the facts of color blindness, tests based on this assumption must fail to be efficient. This, indeed, was the case; no fewer than six varieties of the color blind might escape detection by Holmgren's test, and three of these varieties were dangerously color blind. In addition to this, a great many normal-sighted persons were rejected by this test. Of those who appealed from the decision of the Board of Trade, no less than 38 per cent. one year and 42 per cent. in another were found to have been rejected wrongly. The inefficiency of Holmgren's test was well known to all medical experts on the subject, in fact, none of his recent papers had met with any opposition, but were confirmed even by those who previously opposed him.—*Brit. Med. Jour.*